



XIX. On the preparations of gold lately employed medicinally

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boat's way to be entirely lost, to get true soundings, which enabled me to sound the river in less than half the time, and with more accuracy." But as this letter only relates to the survey of a river, it will be proper to add the following extract from a letter of Mr. Nath. Denham, master of the *Daphne*, October 10, 1809. "Having been on a survey between the islands of Jersey and the rocks to the southward called the Minquies, as also ranging round the island of Jersey, and along the French coast, &c. by order of Rear-admiral D'Auvergne, &c. I used your valuable machine for soundings while running on rhumb lines from one head land to another on the opposite shore, such as from La Corberre Jersey, to the Isle of Brahat; from La Rocheport to Choseys; from thence to Cape Frehel, &c. &c. by which means I was able to make a direct course, and *get perpendicular soundings without heaving to*, so essential to surveys, but saving also much time and trouble, &c."

Thus has the progress of the sounding machine been followed through all its stages; a machine calculated to preserve the lives and properties of thousands, to give ease and comfort to those heroes who devote themselves to the defence of their country. May it prove a source of emolument to the inventor! for, if his labours are to avert desolation from the families of Britons not only in the present but in future ages, his own family can never be neglected by a liberal and grateful nation.

The inventor has presented one of the machines to the Royal Institution, which is preserved in their repository by order of a General Meeting.

XIX. *On the Preparations of Gold lately employed medicinally.* By A. S. DUPORTAL, M.D. &c. and TH. PELLETIER, Apothecary*.

AFTER having enjoyed some reputation as a medicine, gold had ceased to be administered to the patient, and taken an opposite direction. Lately, however, Dr. Chretien, of Montpellier, a physician of great reputation and successful practice, has revived its use. He has employed it in siphylitic and lymphatic affections, and chiefly in Clark's mode. The preparations he uses are metallic gold in a state of minute division, oxide of gold precipitated by potash, the oxide precipitated by tin, and the triple muriate

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of gold and soda. These he considers as superior to mercurials. Some experiments by Mr. Vauquelin, on the preparations of gold thus introduced into notice, have already been given: but we shall now present our readers with some remarks on the subject by the gentlemen above mentioned, one of whom enjoyed the advantage of a personal acquaintance with Dr. Chrestien at Montpellier.

The first preparation of gold employed by this physician was the metal in a state of minute division. To obtain this, he found an amalgam, by triturating leaf-gold with seven times its weight of mercury in a marble mortar with a glass pestle, and then expelling the mercury by means of a powerful lens in the height of summer, or dissolving it out by pure nitric acid.

The present writers recommend rather to precipitate a solution of muriate of gold by a solution of sulphate of iron at a minimum, filtering, and washing the precipitate with water, acidulated by muriatic acid, in order to dissolve out the oxide of iron mingled with the precipitated gold. When the gold is thoroughly dried, it is in the form of a deep brown powder, though in the metallic state; all metals losing their brilliancy by being minutely divided.

To prepare the oxide of gold precipitated by potash, they direct one part of nitric acid at 40° [sp. gr. 1.396] to be mixed with four of muriatic acid at 12° [1.089]; and cupelled gold to be heated with eight times its weight of this menstruum in a matrass with a long, narrow neck, till it boils gently. When no more gold will dissolve at this temperature, the solution is to be poured off, and evaporated to dryness in another matrass by a gentle fire. The residuum of this evaporation is to be dissolved in distilled water, and filtered.

The filtered solution is to be treated with potash, to separate from it the oxide of gold; but in this there are great difficulties, and the whole cannot be thrown down, without part of it being reduced to the metallic state. The cause of this is not known; but the authors ascribe it, 1. To the formation of a soluble triple muriate, which takes place when the potash is poured into the solution of muriate of gold: 2. To the excess of acid always present in this muriate: 3. To the more or less caustic state of the alkali employed: 4. To the greater or less quantity of this substance added to the muriate of gold.

When a solution of caustic potash is poured into a saturated

turated solution of gold by muriatic acid, a yellow precipitate is formed*, which, when collected on a filter, does not amount to more than 40 grs. of oxide from 72 grs. of the metal in the solution. The remaining liquid is of a very deep colour, and contains a triple muriate of gold and potash. A fresh quantity of the caustic alkali will cause no further precipitation, unless the liquid be kept several hours in a gentle heat: but in this case, a new precipitate will fall down, extremely bulky, and of a deeper colour than the former, and apparently at a different degree of oxidation. Several weeks are necessary to complete the precipitation; and even at last a certain portion of gold will remain, which must be thrown down by a slip of tin, if we would lose nothing.

If the solution of gold be very acid, there will be scarcely any perceptible precipitation; and this might be expected, as the alkali finds a sufficient quantity of free acid, to form muriate of potash enough for the production of the triple salt. Indeed, no precipitation at all ought to take place, when the solution is extremely acid; but here, experience does not entirely agree with theory, for a very small quantity of oxide of gold is always produced.

The causticity of the potash is of great importance; for if the neutral carbonate be employed, no change will take place without the assistance of heat. This, expelling a considerable portion of carbonic acid gas, will alter the colour of the solution from yellow to greenish. If it be then filtered, traces of the purple oxide of gold will be found; and it will effervesce with acids, having its fine golden colour restored. A few drops added to a glass of water will not colour it; but, if the water be acidulated, the colour will instantly appear. The same solution yields by evaporation white, transparent, alkaline crystals, interspersed with black spots. These crystals dissolve in water without colouring it; and on filtering the solution it passes transparent, leaving a little gold on the filter. The addition of any acid, however, causes its colour to reappear.

What is the chemical nature of the crystals obtained? Though this was not minutely ascertained for want of time, it appears certain, that they were composed of carbonic and muriatic acid, potash, and gold; but whether constituting a quadruple salt, a triple, or two salts, one the triple muriate of gold and potash, the other subcarbonate

* It is necessary to employ heat.

of potash, the authors cannot say; nor could they form any judgement from the figure of the salt.

It may not be amiss to observe, that, in an impure nitro-muriatic solution of gold, saturated carbonate of potash will precipitate the copper, without throwing down the gold, if no heat be employed.

As too large a quantity of alkali, added to a solution of muriate of gold, will cause a portion of the precipitated oxide to be redissolved, it is necessary to add the alkali cautiously, to boil the solution at every addition of alkali, and to separate the precipitate by filtration, whenever a sensible quantity appears.

The precipitate must be washed but slightly, it being partly soluble in water, as Mr. Vauquelin remarked; and it must be dried in the shade and in a cool place, otherwise it will be a mixture of oxide and metallic gold.

It may be known whether the oxide be pure, by treating it with muriatic acid, which in this case will dissolve it completely; but, if it be mixed with metallic gold, part will remain undissolved.

The oxide of gold precipitated by tin, which Dr. Christien also recommends, may be obtained either with metallic tin, or with its solution.

For the first, slips of tin well cleaned, are to be put into an aqueous solution of muriate of gold. These will soon be covered with a layer of pulverulent matter, of a colour more or less deep; which will be renewed several times, after being removed. When this ceases to be re-produced, the liquor is to be filtered, and the precipitate washed in distilled water, dried in the shade, and powdered. This is the purple powder of Cassius.

If the oxide of gold be precipitated by a solution of tin, it is of importance that the tin be in a fixed state of oxidation, otherwise the product will vary both in its nature and quantity. A uniform solution may always be obtained by dissolving slips of tin in muriatic acid at 12° [1.089], filtering, evaporating to the point of crystallization, dissolving the crystals in pure water, and filtering again. Part of this solution should immediately be mixed with the liquid muriate of gold; and the union of the two salts produces a precipitate, which should be increased by adding fresh quantities of the muriate of tin, as long as any thing is thrown down; after which the precipitate is to be washed, dried, and powdered. The quantity obtained, appears to depend on the quantity of water added to the solutions of gold and tin. The more they are diluted, the more the tin is thrown down.

down. One drachm of gold, the solution of which was mixed with ten quarts of water, mixed with a very dilute solution of tin, yielded five drachms and a half of a very fine purple precipitate.

It does not appear to be a matter of indifference which of these two precipitations is used. When metallic tin is employed, the precipitate is brown; and the gold, if not in the metallic state, is nearly approaching it. On the contrary, the precipitate produced by muriate of tin at a minimum of oxidation, is of a deep purple colour; and, though it contains a little metallic gold, has much more of the oxides of gold and of tin; whence, it is obvious, the efficacy of the two preparations cannot be the same.

The muriate of gold is so greedy of moisture, that it soon deliquesces: whence it can be employed only in the liquid state; and, as its great causticity renders even this difficult, Dr. Chrestien thought of uniting it with the muriate of soda; thus producing a triple muriate, less deliquescent, and less caustic.

For this purpose, a solution of muriate of gold in distilled water, obtained as described above, is to be employed; and it is particularly important that this salt has not an excess of acid. Into this solution is to be poured an aqueous solution of pure decrepitated muriate of soda, so as to combine an equal quantity of the dry salt with the gold dissolved. The two solutions being mixed, the fluid is to be evaporated by a gentle heat in a glass capsule, taking care to stir it well toward the end of the process. When the mass is sufficiently dry, it is to be powdered while hot in a glass or stone mortar; and the powder is to be kept from moisture, which it attracts in a slight degree.

In this preparation the management of the fire is of great importance: for, if the desiccation of the salt be not carried far enough, it will contain too much acid; and, if it be urged too far, it will be in part decomposed, and mixed with a little gold.

The enlightened physician who extols the use of these preparations, employs them externally and internally; but recommends them to be mixed with other substances, lest their action should be too violent, if given alone. Thus for a long time he did not give the triple muriate of gold and soda, otherwise than mixed with twice its weight of a powder composed of starch, charcoal, and the lake used by painters. As the alumine of the last, however, might take up a portion of the muriatic acid, and the charcoal might

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revive the gold, Dr. Chrestien changed this powder for liquorice root, orris root, &c.

Beside this, he joined the compounds of gold with extracts of the attenuant plants; sugar, with which he forms lozenges; syrups, in which he dissolves them, &c. He mixes them also with Galen's cerate, when he wishes to promote suppuration; and with lard, when he would employ them in frictions on the soles of the feet, after the method of Cyrillo.

The writers of the present article do not approve of the combination of the preparations of gold with these different substances, as all vegetable and animal substances, dissolved or not, revive gold from its acid solution. They recommend them to be given alone, or dissolved in distilled water: or, at least, if they must be mixed, to mix them as short a time as possible before they are used.

In this way Dr. Duportal asserts that he has found good effects from them in siphylitic complaints. In a chancre corroding one of the corpora cavernosa he found them of real advantage: but the most striking instance of their efficacy was in a cancerous ulcer, that had destroyed the upper lip, attacked the soft parts of the nose and left cheek, destroyed the square bones [*os carrés*], and rendered the maxillary bone carious. Being called to a consultation with Dr. Payen on this very serious case, in which all the common methods had been tried in vain, Dr. Duportal hoped to oppose the progress of the disease by the use of Dr. Chrestien's medicine, assisted by attenuant extracts. In consequence, the patient was directed daily to rub into the gums the triple muriate of gold and soda; and to take oxide of gold precipitated by potash, with pills composed of the extracts of white henbane, hemlock, and sharp-pointed toad-flax. The ulcer was daily washed with Sydenham's liquid laudanum, sprinkled over with powder of red bark and camphor, and dressed with a digestive, in which oxide of gold was mixed. Under this treatment, which has been continued two months, gradually increasing the dose of the substances, the ulcer has assumed a promising appearance; the carious points have disappeared; the suppuration furnishes laudable pus in moderate quantity; the patient daily improves in flesh and strength; and there is every reason to believe that this evident melioration will continue. That it cannot be ascribed to the means employed in conjunction with the preparations of gold is evident, for they had been used previous to these, without effect.

XX. Mr,